
Information technology — Redfish scalable platforms management API specification

Technologies de l'information — Spécification API (interface de programmation d'applications) relative à la gestion des plates-formes évolutives Redfish





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This document was prepared by the Distributed Management Task Force, Inc. (DMTF) (as DSP0266) and drafted in accordance with its editorial rules. It was adopted, under the JTC 1 PAS procedure, by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

CONTENTS

1. Abstract 8

2. Normative references 8

3. Terms and definitions 9

4. Symbols and abbreviated terms..... 12

5. Overview 12

 5.1. Scope..... 13

 5.2. Goals 13

 5.3. Design tenets 14

 5.4. Limitations..... 14

 5.5. Additional design background and rationale..... 15

 5.5.1. REST-based..... 15

 5.5.2. Follow OData conventions 15

 5.5.3. Model-oriented 16

 5.5.4. Separation of protocol from data model..... 16

 5.5.5. Hypermedia API service endpoint..... 16

 5.6. Service elements 16

 5.6.1. Synchronous and asynchronous operation support..... 16

 5.6.2. Eventing mechanism..... 17

 5.6.3. Actions..... 17

 5.6.4. Service entry point discovery 17

 5.6.5. Remote access support 18

 5.7. Security 18

6. Protocol details..... 18

 6.1. Use of HTTP 19

 6.1.1. URIs 19

 6.1.2. HTTP methods 20

 6.1.3. HTTP redirect..... 21

 6.1.4. Media types 21

 6.1.5. ETags 21

 6.2. Protocol version 22

 6.3. Redfish-defined URIs and relative URI rules 23

 6.4. Requests..... 24

 6.4.1. Request headers 24

 6.4.2. Read requests (GET) 26

 6.4.3. HEAD 28

 6.4.4. Data modification requests..... 29

 6.5. Responses..... 32

 6.5.1. Response headers 33

 6.5.2. Status codes 35

 6.5.3. Metadata responses..... 38

 6.5.4. Resource responses 41

Redfish Scalable Platforms Management API Specification	DSP0266
6.5.5. Resource Collection responses	49
6.5.6. Error responses.....	50
7. Data model and Schema.....	53
7.1. Schema repository.....	53
7.1.1. Programmatic access to schema files	53
7.2. Type identifiers.....	54
7.2.1. Type identifiers in JSON.....	54
7.3. Common naming conventions	54
7.4. Localization considerations	55
7.5. Schema definition	55
7.5.1. Common annotations	55
7.5.2. Schema documents	56
7.5.3. Resource type definitions.....	58
7.5.4. Resource properties.....	58
7.5.5. Reference properties.....	62
7.5.6. Resource actions	64
7.5.7. Resource extensibility	65
7.5.8. Oem property examples.....	67
7.6. Common Redfish resource properties.....	69
7.6.1. Id	69
7.6.2. Name.....	69
7.6.3. Description	55
7.6.4. Status	70
7.6.5. Links	70
7.6.6. Members	70
7.6.7. RelatedItem.....	70
7.6.8. Actions.....	17
7.6.9. OEM	70
7.7. Redfish resources.....	71
7.7.1. Current configuration.....	71
7.7.2. Settings	71
7.7.3. Services	71
7.7.4. Registry	72
7.8. Special resource situations.....	72
7.8.1. Absent resources	72
7.8.2. Schema variations.....	72
8. Service details.....	73
8.1. Eventing.....	73
8.1.1. Event message subscription	74
8.1.2. Event message objects	74
8.1.3. Subscription cleanup.....	75
8.2. Asynchronous operations	75
8.3. Resource tree stability	76

DSP0266	Redfish Scalable Platforms Management API Specification	
8.4. Discovery		77
8.4.1. UPnP compatibility		77
8.4.2. USN format		77
8.4.3. M-SEARCH response		77
8.4.4. Notify, alive, and shutdown messages		78
9. Security		18
9.1. Protocols		78
9.1.1. TLS		78
9.1.2. Cipher suites		78
9.1.3. Certificates		79
9.2. Authentication		79
9.2.1. HTTP header security		79
9.2.2. Extended error handling		80
9.2.3. HTTP header authentication		80
9.2.4. Session Management		80
9.2.5. AccountService		83
9.2.6. Async tasks		83
9.2.7. Event subscriptions		83
9.2.8. Privilege model/Authorization		83
9.2.9. Redfish Service Operation to Privilege Mapping		84
10. Redfish Host Interface		92
11. Redfish Composability		92
11.1. Composition Requests		92
11.1.1. Specific Composition		92
12. ANNEX A (informative)		93
12.1. Change log		93

Foreword

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1. Abstract

The Redfish Scalable Platforms Management API ("Redfish") is a new specification that uses RESTful interface semantics to access data defined in model format to perform out-of-band systems management. It is suitable for a wide range of servers, from stand-alone servers to rack mount and bladed environments but scales equally well for large scale cloud environments.

There are several out-of-band systems management standards (defacto and de jour) available in the industry. They all either vary widely in implementation, were developed for single server embedded environments or have their roots in antiquated software modeling constructs. There is no single industry standard that is simple to use, based on emerging programming standards, embedded friendly and capable of meeting large scale data center & cloud needs.

2. Normative references

The following referenced documents are indispensable for the application of this document. For dated or versioned references, only the edition cited (including any corrigenda or DMTF update versions) applies. For references without a date or version, the latest published edition of the referenced document (including any corrigenda or DMTF update versions) applies.

- [IETF RFC 3986](http://www.ietf.org/rfc/rfc3986.txt) T. Berners-Lee et al, Uniform Resource Identifier (URI): Generic Syntax, <http://www.ietf.org/rfc/rfc3986.txt>
- [IETF RFC 4627](http://www.ietf.org/rfc/rfc4627.txt), D. Crockford, The application/json Media Type for JavaScript Object Notation (JSON), <http://www.ietf.org/rfc/rfc4627.txt>
- [IETF RFC 5789](http://www.ietf.org/rfc/rfc5789.txt), L. Dusseault et al, PATCH method for HTTP, <http://www.ietf.org/rfc/rfc5789.txt>
- [IETF RFC 5280](http://www.ietf.org/rfc/rfc5280.txt), D. Cooper et al, Web linking, <http://www.ietf.org/rfc/rfc5280.txt>
- [IETF RFC 5988](http://www.ietf.org/rfc/rfc5988.txt), M. Nottingham, Web linking, <http://www.ietf.org/rfc/rfc5988.txt>
- [IETF RFC 6901](http://www.ietf.org/rfc/rfc6901.txt), P. Bryan, Ed. et al, JavaScript Object Notation (JSON) Pointer, <http://www.ietf.org/rfc/rfc6901.txt>
- [IETF RFC 6906](http://www.ietf.org/rfc/rfc6906.txt), E. Wilde, The 'profile' Link Relation Type, <http://www.ietf.org/rfc/rfc6906.txt>
- [IETF RFC 7230](http://www.ietf.org/rfc/rfc7230.txt), R. Fielding et al., Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing, <http://www.ietf.org/rfc/rfc7230.txt>
- [IETF RFC 7231](http://www.ietf.org/rfc/rfc7231.txt), R. Fielding et al., Hypertext Transfer Protocol (HTTP/1.1): Semantics and Content, <http://www.ietf.org/rfc/rfc7231.txt>
- [IETF RFC 7232](http://www.ietf.org/rfc/rfc7232.txt), R. Fielding et al., Hypertext Transfer Protocol (HTTP/1.1): Conditional Requests, <http://www.ietf.org/rfc/rfc7232.txt>
- [IETF RFC 7234](http://www.ietf.org/rfc/rfc7234.txt), R. Fielding et al., Hypertext Transfer Protocol (HTTP/1.1): Caching, <http://www.ietf.org/rfc/rfc7234.txt>
- [IETF RFC 7235](http://www.ietf.org/rfc/rfc7235.txt), R. Fielding et al., Hypertext Transfer Protocol (HTTP/1.1): Authentication, <http://www.ietf.org/rfc/rfc7235.txt>

- [ISO/IEC Directives](http://isotc.iso.org/livelink/livelink.exe?func=ll&objId=4230456&objAction=browse&sort=subtypeH), Part 2, Rules for the structure and drafting of International Standards, <http://isotc.iso.org/livelink/livelink.exe?func=ll&objId=4230456&objAction=browse&sort=subtypeH>
- [JSON Schema, Core Definitions and Terminology, Draft 4](http://tools.ietf.org/html/draft-zyp-json-schema-04.txt) <http://tools.ietf.org/html/draft-zyp-json-schema-04.txt>
- [JSON Schema, Interactive and Non-Interactive Validation, Draft 4](http://tools.ietf.org/html/draft-fge-json-schema-validation-00.txt) <http://tools.ietf.org/html/draft-fge-json-schema-validation-00.txt>
- [OData Version 4.0 Part 1: Protocol](http://docs.oasis-open.org/odata/odata/v4.0/os/part1-protocol/odata-v4.0-os-part1-protocol.html). 24 February 2014. <http://docs.oasis-open.org/odata/odata/v4.0/os/part1-protocol/odata-v4.0-os-part1-protocol.html>
- [OData Version 4.0 Part 2: URL Conventions](http://docs.oasis-open.org/odata/odata/v4.0/os/part2-url-conventions/odata-v4.0-os-part2-url-conventions.html). 24 February 2014. <http://docs.oasis-open.org/odata/odata/v4.0/os/part2-url-conventions/odata-v4.0-os-part2-url-conventions.html>
- [OData Version 4.0 Part 3: Common Schema Definition Language \(CSDL\)](http://docs.oasis-open.org/odata/odata/v4.0/os/part3-csdl/odata-v4.0-os-part3-csdl.html). 24 February 2014. <http://docs.oasis-open.org/odata/odata/v4.0/os/part3-csdl/odata-v4.0-os-part3-csdl.html>
- [OData Version 4.0: Core Vocabulary](http://docs.oasis-open.org/odata/odata/v4.0/os/vocabularies/Org.OData.Core.V1.xml). 24 February 2014. <http://docs.oasis-open.org/odata/odata/v4.0/os/vocabularies/Org.OData.Core.V1.xml>
- [OData Version 4.0 JSON Format](http://docs.oasis-open.org/odata/odata-json-format/v4.0/os/odata-json-format-v4.0-os.html). 24 February 2014. <http://docs.oasis-open.org/odata/odata-json-format/v4.0/os/odata-json-format-v4.0-os.html>
- [OData Version 4.0: Units of Measure Vocabulary](http://docs.oasis-open.org/odata/odata/v4.0/os/vocabularies/Org.OData.Measures.V1.xml). 24 February 2014. <http://docs.oasis-open.org/odata/odata/v4.0/os/vocabularies/Org.OData.Measures.V1.xml>
- [Simple Service Discovery Protocol/1.0](http://tools.ietf.org/html/draft-cai-ssdp-v1-03). 28 October 1999. <http://tools.ietf.org/html/draft-cai-ssdp-v1-03>
- [The Unified Code for Units of Measure](http://www.unitsofmeasure.org/ucum.html). <http://www.unitsofmeasure.org/ucum.html>
- [W3C Recommendation of Cross-Origin Resource Sharing](http://www.w3.org/TR/cors/). 16 January 2014. <http://www.w3.org/TR/cors/>
- [SNIA TLS Specification for Storage Systems](http://www.snia.org/tls/). 20 November 2014. <http://www.snia.org/tls/>
- [DMTF DSP0270 Redfish Host Interface Specification](http://www.dmtf.org/sites/default/files/standards/documents/DSP0270_1.0.pdf), http://www.dmtf.org/sites/default/files/standards/documents/DSP0270_1.0.pdf